## REMARKS

In response to the official action:

**[2]** The specification was objected to for incorrect degree signs. The Applicants intend to submit a substitute specification through the mail room on April 23, removing the underlines from the degree symbols "°" (and making no other changes).

**[3-4]** Claims 1-3 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The claims are amended or canceled, and withdrawal of the rejection is requested.

**[5-6]** Claims 1-3 are rejected under 35 U.S.C. §103 as being unpatentable over Kan (U.S. Patent 4,557,582) in view of JP 2-222110.

**Convergence.** The Applicants explain at page 18, line 9 to page 19, line 2, "First magnetic piece 42 is subjected to orientation magnetization that converges as shown by arrow 44 ... fourth magnetic piece 48 is subjected to orientation magnetization that converges as shown by arrow 49 ... according to this second embodiment, by making the orientation magnetization directions 44 and 49 of the adjacent magnetic pieces 42 and 48 converge towards the outside (apex 43) of the joining face 45 (joining face of N pole side gluing face 42a and N pole side gluing face 48a), a repulsive magnetic field can be generated in most efficient manner."

The Examiner is invited to consider that the non-uniform, converging magnetization shown by the converging arrows 44 and 49 in Fig. 3 will increase the magnetic field at the apex 43.[1]

**Kan.** Kan discloses a magnet roller in Fig. 8A, wherein four pieces are provided at the outer periphery of a shaft 9, respective joining faces coincide with roller radial directions, and adjacent orientation magnetization directions are set towards the joining faces. Thereby, peaks of magnetic poles are generated on the extension lines of the joining faces. But Kan never discloses

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1 Each small volume of magnetic material contributes to the magnetic field at the apex 43, which is the sum of all the field components.. Since all of the field components at the apex point directly toward their respective small volumes, the sum is maximized. When the magnetization is aligned and parallel as in Kan, the field from each small volume points at an angle and the vector sum is decreased.

that the orientation magnetization directions *converge* towards the outside of the joining faces. Kan discloses *parallel* orientation magnetization directions of respective magnet pieces, set at substantially 45° to the joining faces, and this angle is the same throughout every portion of the magnet pieces. As the lines of magnetism are perpendicular, there is no "converging the directions of orientation magnetization towards an outside of the magnet roller," as claimed.

**JP 2-222110.** JP 2-222110 discloses that magnetic pieces 9 are fixed to a body 8 comprising ferrite magnetic material, and that the magnetic pieces are made from "isotropic" R-Fe-B magnetic powder and binder. The magnet piece 9 is held in a groove or recess 9a (Fig. 9; see also Fig. 10). This reference nowhere discloses that the orientation magnetization directions are made to converge; there appears to be only a single orientation magnetization direction. As the material is "isotropic," there is no variation as one moves through the material in any direction. That does not describe a material with converging directions of orientation magnetization, because a property (the magnetization direction) changes through the material.

**Claim 1.** Contrary to the applied references, claim 1 (exemplified by instant Fig. 3) recites that the orientation magnetization directions "converge towards the outside of the magnet roller." Accordingly, the present invention is completely different from the structure disclosed by Kan. Table I in the Applicants' specification (p. 20) shows that when the orientation magnetization directions converge toward the outside of the joining faces, the highest magnetic flux density (970 G) is achieved.

New claim 8, supported at page 18 and Fig. 3, is furthermore patentable for the additional feature of the magnetization converging to the outer apex.

Neither of the applied references discloses convergence, and therefore no combination would reach the Applicants' subject matter even if they were combined. The Applicants respectfully believe that combination is not obvious, because Kan uses magnets in contact and JP '110 uses separates isolated magnets.

**Claim 4.** Kan discloses in Fig. 8A that the orientation magnetization directions, of respective magnetic pieces towards the joining faces, are set at substantially 45° to the joining faces. Accordingly, the sum of the angles of the orientation magnetization directions is substantially 90°. On the contrary, claim 4 recites that the sum of the orientation magnetization directions is set at "less than 90°". New dependent claims 5-7 distinguish still further.

The subject matter of claim 4 is related to the balance of magnetic flux density at the roller surface and the "nip width,"[2] which is the width of the developing agent standing on magnetic poles. The wider the nip width, the more efficiently toner is transferred.

As the sum of the angles of the orientation magnetization directions exceeds 90°, the nip width becomes narrow. At the same time, the magnetic flux density slowly decreases, and uneven developing can occur.

When the sum of the angles of the orientation magnetization directions is less than 90°, the nip width is increased and results are improved. As the sum of the angles drops below 80°, the magnetic flux density begins to drop.

Aside from the nip width, another advantage of the Applicants' claims is that the magnetic repulsion between the magnet pieces is decreased when the angle is less than 90°, so that mechanical stability is better.

The new dependent claims set out preferred ranges, that confer the advantages discussed above, advantages not disclosed or provided by the prior art.

JP '110 does not disclose the subject matter of claim 4 either, and therefore no combination of the references (not admitted obvious) could reach the instant claims.

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2This term is not found in the specification. However, the *advantages* of the claimed subject matter are inherent and therefore are relevant to patentability whether or not described.

Favorable consideration and allowance are respectfully solicited. If this paper is not timely filed, then this paper is a petition for an appropriate extension of time. Fees which may be due with respect to this paper may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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*I hereby certify that this correspondence is being facsimile transmitted to the Patent and Trademark Office (Fax No. (703) **872-9318**) on April 22, 2003.*

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